College, Manchester; the Yorkshire College, Leeds; University College, London; the Mason College, Birmingham; and the Merchant Venturers' School at Bristol. As a typical school laboratory Mr. Robins has very judiciously chosen that of the Manchester Grammar School. We have selected for reproduction here, from among the many sheets of plans with which Mr. Robins's papers are illustrated, portions of the plans of the Central Institute, the Yorkshire College (Leeds), and the laboratories of the Merchant Venturers' School at Bristol, as types of institutions engaged in the work of teaching how science is to be brought to bear upon the industries of this country. In the Merchant Venturers' School we have a building specially constructed for teaching science to large classes of boys; in the Yorkshire College the arrangements, as regards science, were designed with reference to the requirements of students receiving specialised teaching, and who intend to pass into manufactories or workshops, or to become professional chemists, physicists, or engineers; in the Central Institute we have the most highly developed type, designed for selected students coming from the Finsbury College or from the provincial colleges, and who already have a basis of sound scientific knowledge, and are thereby fitted to receive special and advanced instruction in various branches of technology. A careful comparison of the plans of Mr. Waterhouse's buildings, viz. the Yorkshire College and the Central Institute, with that of Mr. Robins erected for the Merchant Venturers, will serve to show how the particular requirements of each class have been met in the case of chemistry. It will be seen that the number and relative size of the various rooms, their mutual position, and internal arrangement of work-tables, &c., are very different in the several buildings, and that these differences are primarily dependent upon the special type of instruction which is contemplated.

In the next paper Mr. Robins deals with the fittings for applied science instruction buildings. Strictly speaking, the two questions of fittings and structure cannot be considered apart, for, as Mr. Robins very truly remarks, "it is of the utmost importance in a truly economic aspect of the question that the architect should possess from the very outset a clear preconception of the structural provisions involved in the particular system of fittings intended." The paper has especial reference to the fittings of chemical and mechanical laboratories; it is singularly full and complete, and admirably illustrated. The fittings of every laboratory of note have been well studied, and the facts are so detailed that the merits of any particular arrangement can be readily determined. It is certain to be of the greatest service to any architect engaged in the erection of this special kind of building.

The last paper which we have space to notice deals with the important question of the heating and ventilation necessary for applied science instruction buildings. It is principally based upon details of the means adopted in four of the most modern erections in this country, viz. the Finsbury Technical College, the Central Institute (South Kensington), the Yorkshire College, and the Merchant Venturers' School. These buildings are characterised by very wide differences in compactness and in the relative proportions of inside and outside walls; and the particular modes of heating, that is, whether by steam or hot water, are also different. In some of the buildings the vitiated air is extracted by a chimney, or by a fan; in others the fresh air is forced into the buildings by a fan. Each system has its merits and defects, and most of these are pointed out in the paper, or in the appendix containing the remarks made during the discussion which followed the reading of Mr. Robins's paper at the Institute of British Architects.

It will be seen therefore that Mr. Robins has treated this question of the provision of buildings for applied science instruction in a remarkably comprehensive manner. The collection of papers is certain to be of the greatest service to any architects engaged in the erection of buildings of this class; it constitutes, indeed, a sort of *vade mecum* to the building committees who may be responsible for the selection of the architect's plans. The cause of technical education in this country is under a debt of gratitude to Mr. Robins for the service which he has thus rendered to it.

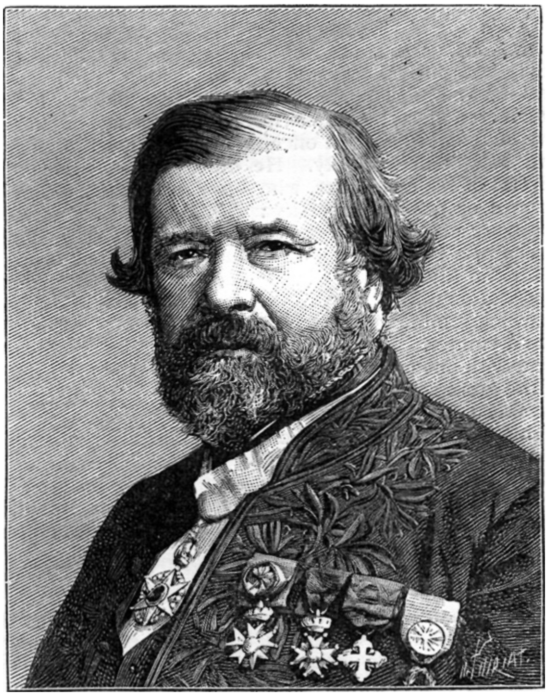
T. E. THORPE

JULES JAMIN

A SHORT time ago we announced the death of the eminent French physicist, Prof. Jamin.

By the courtesy of the editor of *La Nature* we are enabled this week to give an excellent portrait, to which we add a brief sketch of his scientific career, for the details of which we are indebted to the same source.

Jamin was born, in 1818, in the village of Termes in the Ardennes. He was the son of Anthony Peter Jamin, who engaged as a volunteer in 1795, was appointed Captain and decorated at the battle of Friedland, and afterwards retired to his native country. Jamin was brought up first in a little school in the village of Vouziers, and his father sent him to the College at Reims.



At the end of the first year there Jamin had gained nine prizes, and in 1838 his work was crowned with the prize of honour in a general competition between the Colleges of Paris and the Departments. In the same year he entered the École Normale Supérieure, and three years after, in 1841, he came out first prizeman in physical science. He was then appointed to the College at Caen, where he succeeded Desains, whom he found later as colleague at the Sorbonne, and survived only a few months. At the end of two years he was called to Paris as Professor of Physics at the Collège Bourbon. The following year, in 1844, he became Professor at the College of Louis-le-Grand, where he continued his researches commenced at Caen, and he received in 1847 his Doctorate of Physical Science for a thesis, now a classic, on the reflection of light on the surface of metals.

The precision, elegance, and solidity of his instruction,

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the value of his scientific work, all designated him for some superior professorship; so, in 1852, he was elected Professor of Physics at the Polytechnic School. He lectured there with success for twenty-nine years—till 1881, when he resigned.

In 1863 he was appointed Professor at the Sorbonne, where, till his death, he attracted a great number of eager listeners. In this position he displayed his admirable talent of exposition, his great power of simplifying the most difficult questions, and of indicating by most striking apparatus the methods of solving many intricate problems.

The qualifications that Jamin displayed in his oral teaching are found in the "Traité Général de Physique," which reproduces his course at the Polytechnic School, and in which masters as well as pupils find exact descriptions of the actual state of science.

Jamin was not only a physicist; his mind was open to all manifestations of intelligence. At the Normal School, in preparing for his degree in physics, he found time to obtain one in natural sciences also. At Caen he went with his pupils on Sundays on botanical and geological excursions. But it was only on his return to Paris that his great power, elevated ideas, distinguished tastes and his fine intelligence could find a free scope. He remembered always with pleasure how at the age of twenty-five he found himself at once surrounded by an intelligent and enlightened society. He dined in a *pension* with several of his colleagues, who have left names either in science or at the University: with Lefebvre, the eminent professor at the Collège Rollin, with Saisset, Barni, Suchet, La Provostaye; with Faurie, who often brought his friend Sturm. The dinner was followed by long chats, dissertations on science, philosophy, music and art, in which Jamin took an active part. He loved music; he was a painter. He was an early riser, and on Sundays he went with one or two of his colleagues to study the works of the great masters at the Louvre. He painted an admirable portrait of Lefebvre; his family preserve several of his paintings, and the church at Termes possesses a picture of his composition.

But art and literature only occupied his leisure; he produced at that period his most important scientific works—works which procured for him in 1868 admission into the Academy of Sciences.

His researches embrace the most varied subjects. Besides his optical, magnetic, and electrical researches, which remain his best titles to fame, his studies on the compressibility of liquids, on capillarity, hygrometry, specific heats, the critical points of gases, prove the originality and versatility of his genius.

By their historical order and succession his memoirs indicate the progress of physics in France since the middle of the century to the present day. A pupil and admirer of Cauchy, it was by his optical experiments that he made his debut, and it was also to this subject that he most frequently returned.

He took great pains to invent methods of measurement delicate enough to control the analytical results of Cauchy, and his first memoir is a beautiful study of reflection of light by the surfaces of metals. He discovered afterwards the elliptical polarisation of light reflected by vitreous substances near the polarising angle, anticipated by Cauchy's theory; and discovered at the same time the negative elliptical polarisation of fluorine, which no one suspected. He published a long memoir on coloured rings, and invented interference-apparatus utilising the light reflected on opposed faces of thick transparent plates.

When in 1868 M. Durny, then Minister of Public Instruction, founded the École Practique des Hautes Études, and endowed a research laboratory, Jamin profited by the powerful aid thus placed at his disposal. The rapid and so unlooked for progress in electricity supplied a new field for his activity. Assisted at first by inexperienced workers, he thought, and worked for all; he undertook ten different researches, of which one would have absorbed all the time and power of one less indefatigable.

Cruelly touched by family affliction, he found in the midst of his workers, who needed continually his aid and assistance, some relief for his great grief. During some time before his death he seemed to have mastered his sorrows and to have regained his usual activity. He had succeeded his illustrious master, M. Dumas, as Perpetual Secretary of the Academy of Sciences, and no one was more fitted to have filled this delicate office. He had replaced Milne Edwards as Dean of the Faculty of Sciences, and at the time of his death he was at the height of his reputation.

His death leaves a large gap in Parisian scientific society, and those English men of science who had the privilege of knowing him and admiring his genial and powerful nature and his admirable private life will long mourn his loss.

R.

THE U.S. NAVAL OBSERVATORY[1]

IN 1880 a site was purchased for a new Naval Observatory a short distance beyond Georgetown, in the district of Columbia; but no appropriation has yet been made for erecting the necessary buildings and removing the instruments from the present location. On account of this delay the Secretary of the Navy, in April 1885, called upon the National Academy of Sciences for an expression of opinion as to the advisability of proceeding promptly with the erection of a new Naval Observatory; and the reply of the Committee of the Academy is contained at length in a letter from the Secretary of the Navy, just published as Executive Document No. 67. The conclusions of the Committee we give in the language of the Report. This Report is signed by F. A. P. Barnard, A. Graham Bell, J. D. Dana, S. P. Langley, Theodore Lyman, E. C. Pickering, C. A. Young. (1) It is advisable to proceed promptly with the erection of a new Observatory upon the site purchased in 1880 for this purpose. (2) It is advisable that the Observatory so erected shall be, and shall be styled, as the present Observatory was styled originally, the "National Observatory of the United States," and that it shall be under civilian administration. (3) It is advisable that the instruments in the present Observatory, with the exception of the 26-inch telescope, the transit circles, and the prime vertical transit, shall be transferred to the Observatory at Annapolis, with such members of the astronomical staff as may be required to operate them; also that such books of the library as relate chiefly to navigation shall take the same destination; the instruments above particularly specified, with the remainder of the library, being reserved as part of the equipment of the new National Observatory, to which also the remaining officers of the astronomical staff shall be assigned for duty. (4) It is advisable that the Observatory at Annapolis shall be enlarged, if necessary, and adapted to subserve as effectually as possible the wants of the Naval Service, whether practical, scientific, or educational; that it shall be under the direction of the department of the Navy, and shall be styled the "Naval Observatory of the United States." The grounds upon which this decision is based are set forth in the document to which we have referred; and numerous letters are appended, from astronomers and others, in regard to the administration of the Observatory, and from physicians of Washington, upon the healthfulness of the portion of the city in which the Observatory is at present situated. It will be seen immediately that this report is intended to favour the establishment of an Observatory worthy of the country, and the

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[1] From *Science*.

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